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The Public Perception of Palaeontology in Scotland: "Archaeologists dig dinosaurs"

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Introduction

There is very little written about how palaeontology is perceived by the public. Perhaps the reason is that very few professional palaeontologists have concerned themselves with public opinion, so engrossed they are with their own speciality and not realising that someone else out there may be interested in their findings. Dinosaur palaeontologists are, perhaps, the exception due to the public popularity of these great beasts. Dinosaurs have captured the public's imagination since they were first discovered in the 1800s. They have been the subject of numerous films and documentaries but have often erroneously been linked with archaeology. It is not something that palaeontologists worry about too much beyond the amusement of having a member of the public attempt to discuss the Roman fort, or Celtic cross in the vicinity, whilst the palaeontologist looks for fossils hundreds of millions of years old. It may be of more annoyance to archaeologists when they are asked if they have unearthed any dinosaurs lately. Certainly, that seems to be the case as there have been several articles published on the public perception of archaeology, and they all seem to be upset at the number of times they are asked about dinosaurs. I think that the confusion may arise from the fact that archaeologists often dig things up and that palaeontologists do pretty much the same thing. The difference is that archaeologists ignore the fossils, and palaeontologists ignore the artefacts. Well, not quite … archaeologists will inform palaeontologists of any fossils found during an excavation and similarly, palaeontologists will inform archaeologists of any artefacts they find during an excavation.

The term 'fossil', now used almost exclusively in palaeontology and geology, used to apply to a lot more than the remains, or evidence, of some petrified life form from the distant past. It comes from the Latin word *fossilis* which means 'dug up' and could, at one time, apply to almost anything disinterred. Since 1736, the term 'fossil' has been applied to "geological remains of a plant or animal" (Harper 2001), and the more generalist definition became obsolete.

So, why the confusion? I doubt that the public still uses the term 'fossil' to mean everything dug-up. More likely, the confusion stems from a lack of reinforcement of the differences between archaeology and palaeontology through education and information media. It also may be that the public perceive the branding or film role models of archaeologists and palaeontologists as very similar. Sam Neill, who plays Dr Alan Grant (palaeontologist), in Jurassic Park (1993), is little different from Harrison Ford, who plays Indiana Jones (archaeologist), in Raiders of the Lost Ark (1981). Newspaper editors are frequently guilty of using the term archaeologist when describing a palaeontologist's research. To look into this further it is useful to see how archaeologists see themselves as being perceived by the public.

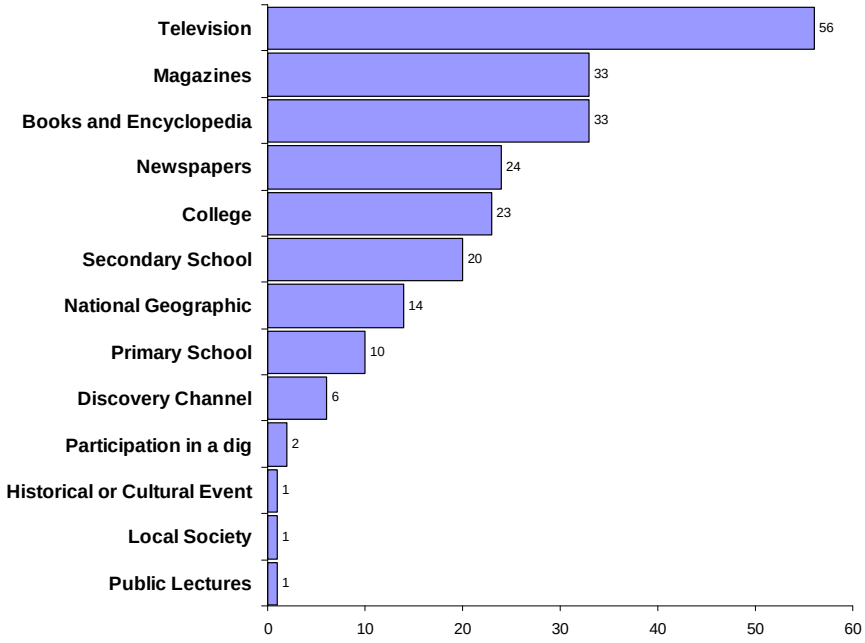
The Public Perception of Archaeology

Ramos and Duganne (2000), examined the public perception of archaeology for the Society of American Archaeology. They found that about 99% of the 1,016 Americans interviewed said that archaeologists study ancient civilisations and the human past. Despite this, 13% of them, when asked what first comes to mind when the term archaeology is mentioned, think of dinosaurs, or digging dinosaurs. The reason for this, according to Ramos and Duganne (2000), is because of the popularity of dinosaurs and the amount of publicity they receive. If

this was the case, then why are politicians, farmers, highway contractors, dentists, or other professions much in the news, not confused with archaeologists?

It is more likely that the confusion stems from the sources of information that the public turns to. Ramos and Duganne (2000) also asked the American public from where they obtained their information on archaeology. Their response was not too surprising. Over half of the respondents replied that the television was a major source of their knowledge on archaeology. Newspapers, magazines, encyclopedia and books were quoted by a quarter to a third of those asked. Only one percent mentioned public lectures as a major source of information (Figure 1).

Figure 1. Chart showing what Americans use as the sources of information on archaeology based on data obtained from Ramos and Duganne (2000).

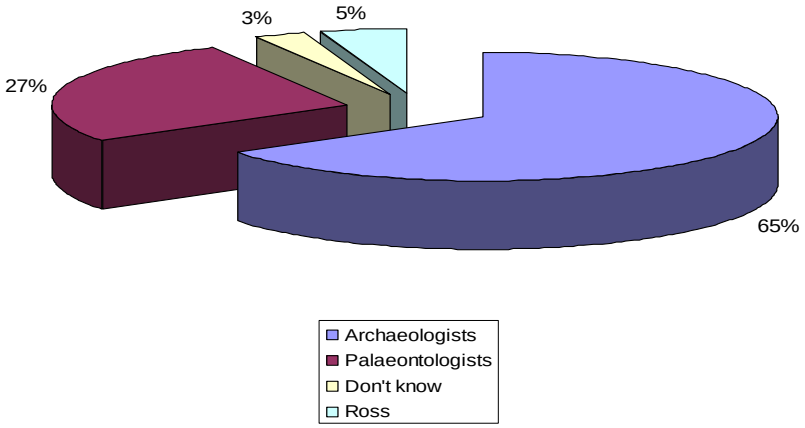


Public Perception of Palaeontology in Scotland

So, what do the public in Scotland think of palaeontology? A small scale study was undertaken, for the *Sea to Sand* conference in Elgin (September 2007), to find out if final-year school children in Scotland, intending to study at the University of Glasgow, knew who digs dinosaurs and what they understood by the terms palaeontology and archaeology. In September 2007, a sample of 100 final-year school visitors to the University of Glasgow's Open Day, were asked four questions. The first answer to each question was recorded and no prompting was given. The questions were asked in the entrance hall to the Hunterian Museum at the University of Glasgow and the questioning was carried out by the author alone.

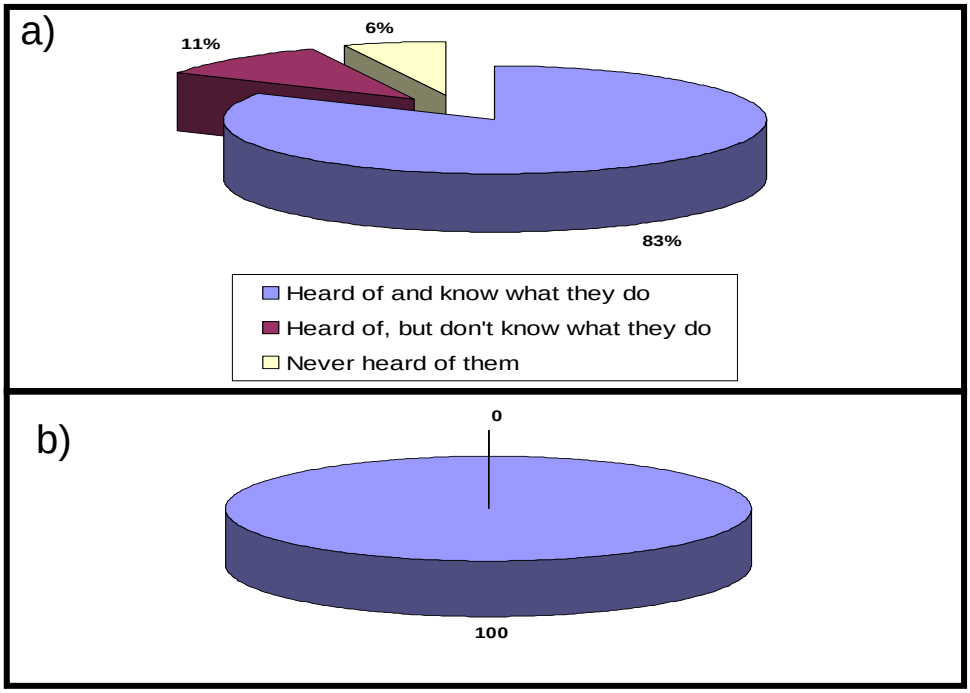
The first question was: Who digs dinosaurs? Those who responded with 'archaeologists' were in the majority with 65% of respondents. Surprisingly, only 32% knew that palaeontologists dig dinosaurs, which includes the 5% who said 'Ross from Friends', and only 3% didn't know who digs dinosaurs (Figure 2).

Figure 2. Pie chart showing who prospective students at the University of Glasgow think dig dinosaurs.



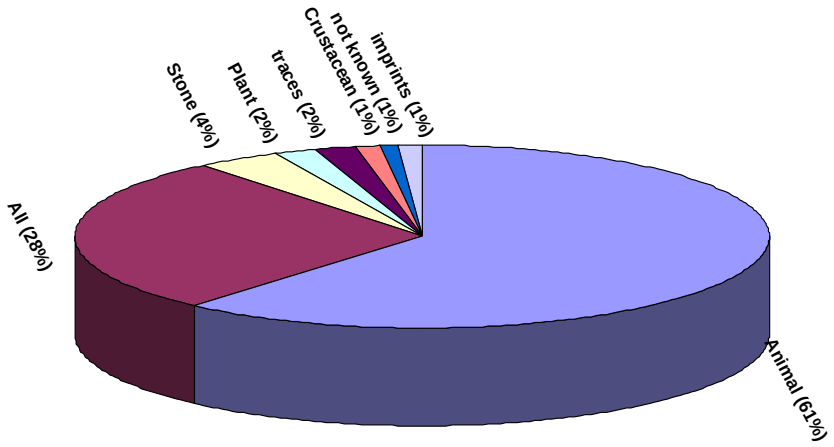
Despite this, when asked a question about what a palaeontologist does, a stunning 83% knew what palaeontologists do. Many of those who responded with ‘archaeologist’ with the first question, realised their error and changed their response to palaeontologist. That left 11% not knowing what palaeontologists do and a further 6% who have never even heard of the term ‘palaeontologist’ (Figure 3a). When the same was asked of archaeology, a full 100% knew what archaeologists do and had heard of the term ‘archaeologist’ (Figure 3b).

Figure 3. a) Pie chart showing whether prospective students at the University of Glasgow have heard of the term ‘palaeontologist’ and know what they do.
b) Pie chart showing whether they have heard of the term ‘archaeologist’ and know what they do.



When asked what they thought a fossil was, none of them suggested that it was anything dug up, the original definition of what a fossil is, although 4% did say ‘a stone’. Another 1% had absolutely no idea what a fossil was. 95% of the respondents identified fossils with the remains of some form of dead organism, or their traces, from the distant past (Figure 4). Considering the difficulty palaeontologists have with the definition of what a fossil is, it is not surprising that the students had difficulty being precise and all inclusive in their responses. A surprising 28% stated that the term ‘fossil’ referred to the remains, and traces, of past life held in the rock record. The largest section of those asked considered that fossils were the remains of animals (61%), with 2% identifying plants, and 1% identifying crustaceans as the first thing to come to mind when they thought of fossils!

Figure 4. Pie chart showing what prospective students at the University of Glasgow think fossils are.



The study here only looked at a very small group close to the peak of their secondary education development. A larger number and more diverse selection of the public, from different educational backgrounds and interests, may provide different results. It is clear, however, that, even with this small group, there is some confusion over the respective roles of archaeologists and palaeontologists. It appears that most of the confusion stems from not knowing much about palaeontology, or not having heard the term associated with fossils sufficiently to make the association. The obvious question is: why has this association not been made despite the obvious popularity of fossils, and dinosaurs in particular? In an attempt to address this question, a small scale study was conducted on one of the primary sources of information identified by Ramos and Duganne (2000): news articles.

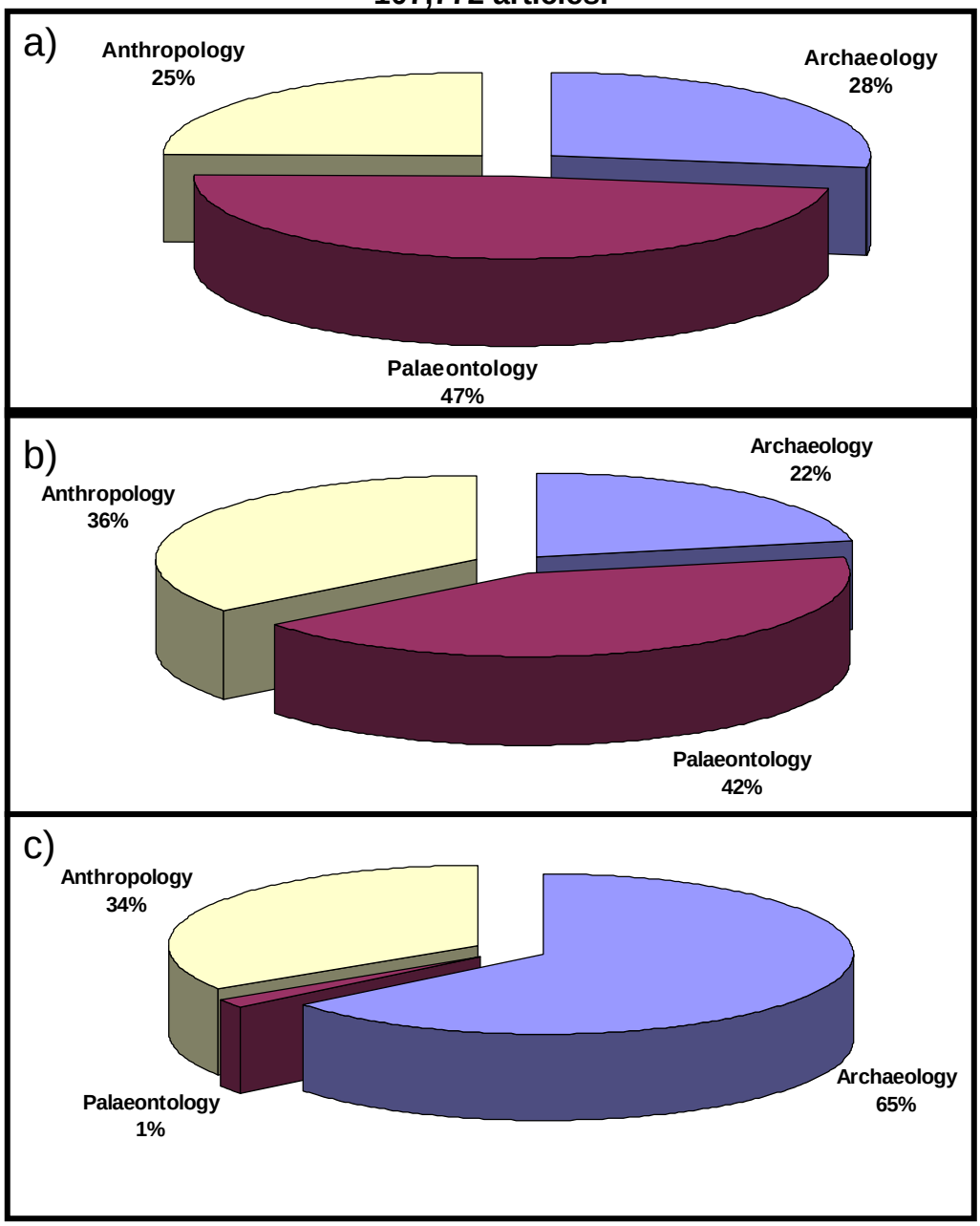
Archaeologists and Dinosaurs

An examination was made of articles recorded in Google news which covers 4,500 news sources worldwide. A search was done to see how many articles were published that included the terms ‘archaeologist’, ‘archaeology’, ‘palaeontologist’, ‘palaeontology’, ‘dinosaur’, ‘fossil’, ‘artefact’, ‘anthropologist’ and ‘anthropology’. (Both American and non-American spellings of these terms were used). The last two terms were introduced to see if there was also some confusion between palaeontology and anthropology as well as archaeology. The study was conducted on the 18th October 2007.

Interestingly, more than half the number of articles written on dinosaurs (n=18,345), were attributed to either anthropology or archaeology, with only 47% being attributed to palaeontology (Figure 5a). A similar picture emerges for the articles that mention the term ‘fossil’ with only 42% being attributed to palaeontology (n=21,180) (Figure 5b). Admittedly,

a significant part of anthropology deals with ‘fossil man’, but only about 100 of the 222,600 anthropology related news articles were found to contain this term (Table 1). At least the picture is a little better when the term ‘artifact’/’artefact’ was looked at in news articles relating to the three disciplines with only 1% of the palaeontological articles using this term (n=68,247) (Figure 5c).

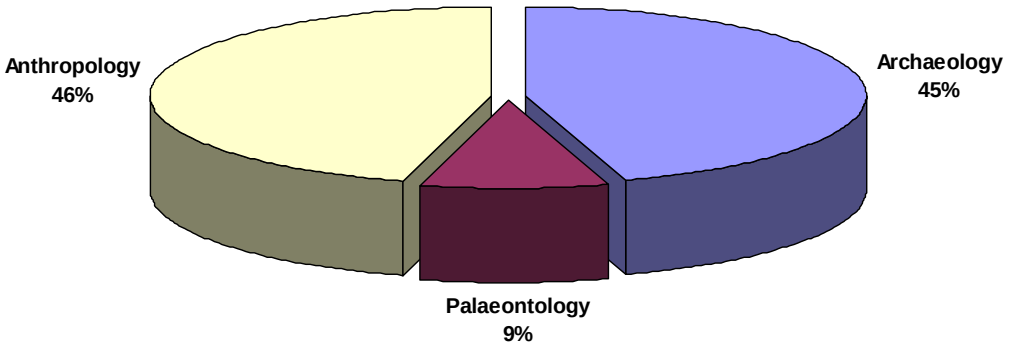
Figure 5. Pie chart showing the relative number of articles written on a) dinosaurs; b) fossils; c) artifact/artefact, using terms that refer to the different disciplines of archaeology, anthropology and palaeontology using Google news (2007) based on 107,772 articles.



Of the total number of articles written on the three disciplines (n=486,610), only 9% of the articles were palaeontological, and the rest were split evenly between archaeology and anthropology (Table 2; Figure 6). Less than 5% of all the archaeological and anthropological

articles were actually about palaeontological discoveries. This means that nearly 30% of all palaeontological news articles are incorrectly attributed to archaeology or anthropology. It is not surprising, therefore, that the public is confused as to whether dinosaurs are excavated by archaeologists or palaeontologists!

Figure 6. Pie chart showing the relative number of all articles written on the different disciplines of archaeology, anthropology and palaeontology using Google news (2007) based on 486,610 articles.



Dinosaurs and fossils in Scotland and the press

Dinosaurs have only been relatively recently discovered in Scotland. It was in 1982 that the first footprint was discovered, and the early 1990's when the first bones were reported. Since then, there has been a flurry of discoveries including dinosaur footprints from various geological formation within the Middle Jurassic and a few bones and teeth from the Lower and Middle Jurassic (Andrews and Hudson 1984; Barrett 2006; Clark 2001a, 2001b, 2003, 2004, 2005, 2007; Clark and Barco Rodriguez 1998; Clark *et al.* 1995, 2004b, 2005; Liston 2004; Marshall 2005). New discoveries are still being made all the time.

The press coverage of the discoveries has also been variable in quality and quantity. One aspect of the press is that it will sometimes use terms that it thinks the public is more familiar with irrespective of whether it is correct or not. One such case was the article written in the Wolverhampton Express and Star (9th July 1992) entitled *Skye-high excitement over dinosaur*. The article goes on to describe a plesiosaur, which any palaeontologist will tell you is not a dinosaur, which was found on Skye by student Francis Nimmo (Clark *et al.* 1993). The press does not always get it wrong though, and in 1996 several articles were published in the press relating to an injury sustained by myself whilst collecting dinosaur footprints (a broken leg). The articles correctly describe the discoveries as being the footprints of dinosaurs and myself as being a palaeontologist (*Dinosaur hunter stumbles on Skye's Jurassic past* The Times (27th January 1996) and *Dino Doc's Big Break* Courier (2nd February 1996)). However, this cannot be said of all articles relating to dinosaurs on the Isle of Skye such as the one recording the discovery by Colin Aitken of the World's earliest thyreophoran dinosaur where archaeologists are described as working on dinosaur remains (*Beach stroll led to fossil find* The Scotsman (11 September 1999).

It is not just dinosaurs that seem to fall into the category of archaeological remains. Fossils such as the famous 'Elgin Marvel' that was found at Clashach Quarry, Hopeman, near Elgin (Clark 1999, 2001c; Clark *et al.* 2004a; Cruickshank *et al.* 2005) have also been misplaced. In an article in the Sunday Times entitled *Scots scientists recreate the face of the world's oldest dog* (16th March 2003), "a team of Scottish archaeologists have recreated the face of the world's oldest dog …" . Not only were palaeontologists called archaeologists, but the animal is a mammal-like reptile and not a dog at all! In general though, the press in Scotland seems to have got used to using the term 'palaeontology' when dealing with dinosaurs and other fossils.

What we are doing in Scotland to encourage the public awareness of palaeontology?
Palaeontology is more often promoted in combination with geology than alone. Information, activity and interest relating to fossils may be embedded within an organisation although this is not spelled out in the title. For example, in Scotland:

- Scottish Geology Festival and the Scottish Geology website (http://www.scottishgeology.com)
- Regional, city, university and geological societies
- Scottish Earth Science Education Forum (SESEF) (http://www.scottishgeology.com/SESEF/)
- The Northwest Highlands Geopark (http://www.northwest-highlands-geopark.org.uk/)
- Geology walks (Barns Ness, Belhaven Bay, North Berwick, Ardmore Point and many others) and Rangers services.
- Regionally Important Geological/ Geomorphological Sites (RIGS)
- Geotourist groups such as Geowalks (http://www.geowalks.demon.co.uk/) and Shetland Geotours (http://www.shetlandgeology.com/)
- Many museums across Scotland house a substantial amount of palaeontological material such as the National Museum of Scotland (http://www.nms.ac.uk/nationalmuseumhomepage.aspx), the Hunterian Museum (http://www.hunterian.gla.ac.uk/) and, of course, the Elgin Museum (http://www.elginmuseum.org.uk/).
- Scottish Natural Heritage (SNH) (http://www.snh.gov.uk/ - looks after Sites of Special Scientific Interest (SSSIs) amongst other duties.
- British Geological Survey in Scotland (http://www.bgs.ac.uk)
- Many of the universities in Scotland still teach palaeontology to their undergraduates in some form, usually as part of an Earth Science, Engineering, or Biology degree, but other courses also have a certain amount of palaeontology – including archaeology courses.

There seems to be quite a lot going on in Scotland for palaeontology, but the message is still not filtering down to the public efficiently. It is hoped that SESEF will help by influencing the curriculum in Scottish schools to allow more geology and palaeontology to be covered.

The Fossil Code
In 2004, the third marshalled list of amendments for stage 2 of the Nature Conservation (Scotland) Act introduced by Mrs MacMillan, MSP for Highlands and Islands, would have made fossil collecting illegal, and anyone collecting, selling or damaging a fossil vertebrate could have been liable for a fine of up to £40,000! Before the Act was passed, a number of objections were lodged and the amendments were withdrawn, but in its place were recommendations for SNH to produce a code for fossil collecting in Scotland (Nature Conservation (Scotland) Act 2004; Chapter 6, Part 4, Section 52, paragraphs 424-426).

“PART 4 - SCOTTISH FOSSIL CODE

Section 52 Scottish Fossil Code

424.Section 52 obliges SNH to prepare and issue a code setting out recommendations, advice and information relating to fossils. The Code is to be known as the Scottish Fossil Code and is intended, in particular, to provide guidance to both professionals and amateurs on good palaeontological and fossil collecting practice. The objective of the Code is to contribute to the protection of Scotland's geological natural heritage, and to promote the scientific understanding of that natural heritage, by providing information on the avoidance of damage to important fossil deposits, whether as a consequence of activities on the site or as a result of the unregulated removal of specimens.

425.SNH is obliged to review and revise the Code as appropriate. SNH must consult with interested persons before drawing up the Code and before making any revisions to it. SNH has a further obligation to publish the Code using appropriate media and to promote awareness and understanding of the Code.

426.Formal legal protection for the most important fossil sites in Scotland is provided by means of the SSSI system and the provisions in Part 2 of the Act. It should also be borne in mind that the unauthorised removal of property belonging to another person, including items such as fossils which are found on that other person's land, amounts to theft.”

Although the wording above seems to discourage fossil collecting, SNH and others involved in the development of the guidelines stress that they would like to encourage responsible collecting of fossils, rather than discourage collecting altogether. The Fossil Code is now in its final stages, having finished the public consultation stage in September 2007 (http://www.snh.org.uk/fossilcode/). It is expected that the final document will be produced in 2008 as a full length document as well as a summary leaflet.

Conservation of Palaeontological Sites

Scotland has a long history of conserving palaeontological sites of interest. One internationally famous locality is Fossil Grove in Glasgow’s Victoria Park. The site consists of a number of *in situ* fossil tree stumps protected by a large rectangular building with a balcony from which the trees can be viewed. The trees were first found in 1887. When the surrounding land was taken over to be used as a park, the trees were uncovered. Due to the foresight of the local authorities, a shelter was constructed to protect the discovery for future generations. The Nature Conservancy Council (now run by SNH) designated fossil grove as a SSSI (Gunning 1995). This is possibly the earliest example of conservation of a palaeontological site in the world.

There are now over 140 palaeontological SSSI sites in Scotland. Access to these is looked after by SNH, and they are protected in law through the Nature Conservation (Scotland) 2004 Act. They range from a Precambrian microfossil site in the West Highlands to a Quaternary mammal site in the North Highlands, and include several of the quarries around Elgin including Clashach, Cuttie’s Hillock and Spynie. The designation of SSSI does not prevent people from collecting at these sites, but it does encourage responsible collecting and notification of important finds, for example in Moray to SNH and Elgin Museum.

3. Scottish Geology Festival

The first Geology Week in Scotland took place in 1990 at the *Dome of Discovery*, an early interactive science centre in Glasgow. Various events took place throughout the week including Tex Rex the dinosaur (the author dressed in a chicken-wire dinosaur suit with papier maché skin and tennis ball eyes) who gave talks and identified rocks throughout the week. Since then, the week has grown into an annual month long festival of geological activities throughout Scotland. The whole month of September is taken up with walks, talks, events and internet interaction provided by societies, rangers, individuals, industry and anyone else willing to impart their enthusiasm for the subject. Of course, it is not just palaeontology that is covered, but everything, from tsunamis in Scotland to volcanoes, from mountains to deep oceans and fossils, from bacteria to dinosaurs. The Festival is now run by a group of enthusiasts from different organisations including SNH, BGS, the National Museum of Scotland, Our Dynamic Earth, the Hunterian Museum, Geowalks and SESEF. It is hoped that the Festival will continue to grow as Scottish Archaeology Month has done. The Scottish Archaeology Month is run by a membership organisation called the Council for Scottish Archaeology. Perhaps geologists should get together and form a similar membership organisation to run the Scottish Geology Festival? … just thinking aloud here. Anyway, we hope that the Scottish Geology Festival will continue into the future bringing geology, and palaeontology, into the public's awareness.

Discussion

Educating and informing the public about palaeontology is undertaken for various reasons. Some museums may educate their stakeholders in order to secure a funding future and safeguard their collections (Erwin and Ziegler 1997). The collections take up valuable (and expensive) space in museums and some managers are unaware of the importance these collections have as a testament to the history of life on Earth. Many collections are not looked at for many years, depending on what research is fashionable enough to attract funding at any particular time. Educating the public will help them support and understand the reasons why palaeontological collections in museums are so important. Other palaeontologists want to educate and inform to enthuse the public with the same fascination they have with their chosen subject or to contribute to debates on the paranormal, antiscience and frankly nonsensical ideas often supported by the popular media, or internet (Lipps 2003).

The lack of palaeontological understanding, and appreciation, is a global phenomenon that palaeontologists are now addressing with increasing vigour (Scott 2005; Sharma 2002). The challenges for the next few decades are to engage and educate script writers from TV and film, book writers and newspaper editors, so that they appreciate the value of palaeontology to our understanding of the evolution of life - and certainly more than the interviewer on BBC radio who asked the following of me: "In a fight, who would win, a *Velociraptor* or a *T. rex*???".

In 2008, the BBC are producing a series called "Fossil Detectives" which should be shown on BBC2 during the summer. It will include a sequence on the Elgin Marvel. Scotland will be covered in just one programme, but the whole series could have been devoted to the Scottish fossils alone. I hope that this is just the beginning of an interest in Scottish fossils that will encourage further coverage on both television and radio and bring more people to the science of palaeontology. What Scotland lacks in land mass, it certainly makes up for in the variety and significance of the fossils it contains.

Oh, and the winner? The *Velociraptor*, if there were more than one.

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Table 1. Total number of articles in the different disciplines. Data acquired by searching Google news (2007).

	Archaeology	Palaeontology	Anthropology	total
total articles	220,300	43,610	222,600	486,510

Table 2. Total number of news articles using the combined terms of the disciplines and dinosaur, fossil and artefact/artefact. Data acquired by searching Google news (2007).

	Dinosaur	Fossil	Artifact/artefact	totals
Archaeology	5,070	4,650	43,842	53,562
Palaeontology	8,745	9,000	1,013	18,758
Anthropology	4,530	7,530	23,392	35,452
totals	18,345	21,180	68,247	107,772